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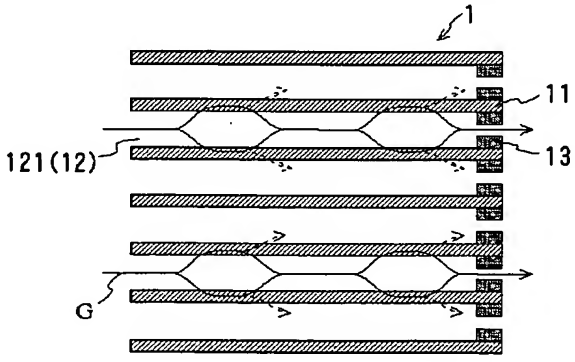
(54)【発明の名称】　排ガス浄化触媒構造体

(57)【要約】
【課題】　触媒構造体の詰まりが起こりにくく、かつ微粒子成分の浄化率が改善された排ガス浄化触媒構造体を提供する。
【解決手段】　本発明の触媒構造体は、排ガス出口側に絞り部１３が設けられた出口絞りセル１２１を有するモノリス担体１と、モノリス担体１に担持された触媒成分とからなる。出口絞りセル１２１を形成する隔壁１１の気孔率は３０～７０体積%である。絞り部１３により排ガス流れに抵抗を与え、かつ隔壁１１が高気孔率なので、排ガスＧを隔壁１１内に入り込ませて微粒子成分を捕捉し、触媒成分と十分に接触させることができる。モノリス担体１は、出口絞りセル１２１と交互に、排ガス入口側に絞り部１３を有する入口絞りセルあるいは排ガス入口側が閉塞された入口閉塞セルが配置されたものであってもよい。触媒成分としては、酸化触媒またはＨＣ、ＣＯおよびＮＯｘ浄化触媒が好ましく用いられる。



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【特許請求の範囲】

【請求項１】　ディーゼルエンジンの排ガスに含まれる微粒子成分の捕捉・燃焼を行う排ガス浄化触媒構造体であって、隔壁により形成された複数のセルを有するモノリス担体と、該モノリス担体に担持された触媒成分とからなり、

上記隔壁の気孔率は３０～７０体積％であり、上記複数のセルは、上記モノリス担体を貫通しており排ガス出口側に絞り部が設けられた出口絞りセルを含むことを特徴とする排ガス浄化触媒構造体。

【請求項２】　上記複数のセルは、上記出口絞りセルと、上記モノリス担体を貫通しており排ガス入口側に絞り部が設けられた入口絞りセルとからなり、該出口絞りセルと該入口絞りセルとは交互に配置されている請求項１記載の排ガス浄化触媒構造体。

【請求項３】　上記複数のセルは、上記出口絞りセルと、排ガス入口側が閉塞された入口閉塞セルとからなり、該出口絞りセルと該入口閉塞セルとは交互に配置されている請求項１記載の排ガス浄化触媒構造体。

【請求項４】　上記触媒成分として酸化触媒が用いられている請求項１、２または３記載の排ガス浄化触媒構造体。

【請求項５】　上記触媒成分として、ＨＣ、ＣＯおよびＮＯｘを浄化する浄化触媒が用いられている請求項１から４のいずれか一項記載の排ガス浄化触媒構造体。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、ディーゼルエンジンの排ガスに含まれる微粒子成分の捕捉・燃焼を行う排ガス浄化触媒構造体に関する。

【０００２】

【従来の技術】ディーゼルエンジンの排ガスに含まれる微粒子成分を浄化する方法としては、（１）目封じ型セラミックハニカム等のフィルタを用いて排ガス中の微粒子成分を捕捉し、蓄積した微粒子成分をバーナまたはヒータ等の外部着火手段により燃焼させて上記フィルタを再生する方法と、（２）上記フィルタに触媒物質を担持させ、排ガス中の微粒子成分を捕捉するとともに触媒物質により燃焼も行わせて、バーナまたはヒータを用いた再生の必要をなくす、あるいは再生の頻度を少なくする方法とがある。上記（１）および（２）の方法はいずれも、排ガスがフィルタの隔壁を通り抜ける（ウォールフロー）ときに排ガス中の微粒子成分を捕捉している。

【０００３】また、特開平１－１７１６２６号公報には、セラミックハニカム等の三次元構造体に酸化触媒を担持させ、この触媒構造体の貫通孔に排ガスを流しながら（ストレートフロー）、貫通孔周囲の壁面において排ガスと酸化触媒とを接触させることにより、微粒子成分中のＳＯＦ（可溶有機成分）を連続的に燃焼させる方法が開示されている。

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【０００４】

【発明が解決しようとする課題】しかし、上記（１）の方法によると、外部着火手段を要するため装置が複雑となり、また再生時には微粒子成分が急激に燃焼するためフィルタが損傷しやすい。さらに、供給される排ガス中に含まれる微粒子成分が多いと、フィルタの再生頻度が多くなり経済的に好ましくない。上記（２）の方法によると、再生頻度を少なくすることはできるものの微粒子成分の燃焼制御が難しく、例えば過剰堆積後の急激な燃焼によりフィルタが損傷する場合がある。また、上記（１）および（２）の方法では、微粒子成分の燃焼後に残った灰分（Ａｓｈ）が次第に蓄積されてフィルタを閉塞するという問題がある。

【０００５】一方、上記特開平１－１７１６２６号公報に記載の方法では、排ガスは貫通孔内に流され隔壁を通り抜けることはないので、灰分による触媒構造体の詰まりや、蓄積された微粒子成分の急激な燃焼による損傷は起こりにくい。しかし、このストレートフロー方式により燃焼浄化可能なのは、微粒子成分中のＳＯＦのみである。微粒子成分中の煤分（Ｓｏｏｔ）は触媒構造体を素通りするか、せいぜい表面に付着する程度であって、触媒成分の接触が不十分なため燃焼させることができない。したがって、ウォールフロー方式に比べて微粒子成分の浄化率が著しく低いという問題がある。

【０００６】本発明の目的は、触媒構造体の詰まりが起こりにくく、かつ微粒子成分の浄化率が改善された排ガス浄化触媒構造体を提供することにある。

【０００７】

【課題を解決するための手段】上記課題を解決するために、請求項１記載の排ガス浄化触媒構造体は、ディーゼルエンジンの排ガスに含まれる微粒子成分の捕捉・燃焼を行う排ガス浄化触媒構造体であって、隔壁により形成された複数のセルを有するモノリス担体と、該モノリス担体に担持された触媒成分とからなり、上記隔壁の気孔率は３０～７０体積％であり、上記複数のセルは、上記モノリス担体を貫通しており排ガス出口側に絞り部が設けられた出口絞りセルを含むことを特徴とする。

【０００８】請求項２記載の排ガス浄化触媒構造体は、請求項１記載の構造体において、上記複数のセルは、上記出口絞りセルと、上記モノリス担体を貫通しており排ガス入口側に絞り部が設けられた入口絞りセルとからなり、該出口絞りセルと該入口絞りセルとは交互に配置されていることを特徴とする。

【０００９】請求項３記載の排ガス浄化触媒構造体は、請求項１記載の構造体において、上記複数のセルは、上記出口絞りセルと、排ガス入口側が閉塞された入口閉塞セルとからなり、該出口絞りセルと該入口閉塞セルとは交互に配置されていることを特徴とする。

【００１０】請求項４記載の排ガス浄化触媒構造体は。請求項１、２または３記載の構造体において、上記触媒

成分として酸化触媒が用いられていることを特徴とする。請求項５記載の排ガス浄化触媒構造体は。請求項１から４のいずれか一項記載の構造体において、上記触媒成分として、ＨＣ、ＣＯおよびＮＯｘを浄化する浄化触媒が用いられていることを特徴とする。

【００１１】本発明の排ガス浄化触媒構造体における「モノリス担体」は、例えば多孔質セラミックス等からなり、隔壁により形成された複数の貫通セルを有する。この隔壁の気孔率は３０～７０体積%であり、好ましくは４０～６０体積%、さらに好ましくは４５～５５体積%である。気孔率が３０体積%未満では、本願発明による効果を十分に発揮することができない。一方、気孔率が７０体積%を超えるモノリス担体は製造が困難であり、また強度が不足しやすい。

【００１２】上記「絞り部」とは、上記貫通セルの流路断面積が他の部分に比べて縮小された部分である。通常この絞り部は、出口絞りセルの場合には貫通セルの出口側端に、入口絞りセルの場合には入口側端に設けることが好ましい。絞り部の形状は特に限定されず、セル横断面における中央に開口部（流路）が形成される形状、１または２以上の角部に開口部が形成される形状等とすることができる。

【００１３】出口絞りセルの場合、この絞り部におけるセルの流路断面積の絞り割合は、他の部分の流路断面積を１００%として、開口部（流路）の面積の合計が３０～９０%であることが好ましく、より好ましくは４０～８０%、さらに好ましくは５０～７５%である。また、この絞り部におけるセルの流路断面積は、例えば隔壁厚さ０．３ｍｍ、セル数３００個／ｉｎ²の場合において、０．３～１．２ｍｍ²とすることができ、好ましくは０．４～１．０ｍｍ²とすることができる。絞り部の長さは、例えば３～１０ｍｍであり、好ましくは３～５ｍｍである。絞りの程度が大きすぎると、微粒子成分あるいはその灰分によりこの絞り部において出口絞りセルが詰まりやすくなる。また、圧力損失が増大して内燃機関の性能が実質的に低下するため好ましくない。一方、絞りの程度が小さすぎると、排ガスを隔壁内に入り込ませる効果が不足し、微粒子成分の浄化性能が低下する。

【００１４】上記モノリス担体に担持させる「触媒成分」は、微粒子を着火燃焼させるためのものであって、請求項４記載のように酸化触媒を用いることが好ましい。酸化触媒としては、例えば白金族金属から選択される一種または二種以上を用いることができる。これにより、触媒構造体の入口における排ガス温度が例えば４００℃程度の低温であっても、外部着火手段を用いることなく微粒子成分を捕捉燃焼させることができる。また、請求項５記載のように、この触媒成分としてＨＣ、ＣＯおよびＮＯｘを浄化する浄化触媒（例えばＮＯｘ吸蔵還元触媒）を用いる場合には、この排ガス触媒構造体がＨＣ、ＣＯ、ＮＯｘおよび微粒子（パティキュレート）を除去する四元触媒として機能するものとなるため好ましい。

【００１５】上記触媒成分は、通常はモノリス担体の全体にわたって隔壁の表裏両面に担持され、その担持量はモノリス担体の各部においてほぼ均一であることが好ましい。触媒成分の担持量は特に限定されないが、例えば１～１０ｇ／リットルとすることができる。

【００１６】（作用および効果）本発明の排ガス浄化触媒構造体は、従来のウォールフロー型の排ガス浄化フィルタに用いられる目封じ型セラミックハニカム等とは異なり、貫通したセルを有するので、このセルが微粒子成分やその灰分により閉塞されにくい。また、従来のストレートフロー型の触媒構造体に比べて隔壁の気孔率が高く、かつ出口側に設けられた絞り部により排ガス流に抵抗を与えているため、排ガスの一部が隔壁を通り抜けるか、あるいは隔壁表面より内側に入り込みやすい（半ウォールフロー）。したがって、微粒子成分の少なくとも一部を隔壁により捕捉し、この微粒子成分を触媒成分と十分に接触させて、ＳＯＦのみならず煤までも燃焼させて浄化することができる。なお、従来のストレートフロー型触媒構造体では、隔壁表面よりも内側に排ガスを入り込ませる意図がなかったため気孔率を高くする動機がなく、構造体の強度および製造の容易性から隔壁の気孔率は通常１５～２５体積%程度であった。

【００１７】請求項２記載のように、出口絞りセルと入口絞りセルとが交互に配置された構造とした場合には、入口絞りセル内が負圧となることにより、出口絞りセル内の排ガスが隔壁を通り抜けて入口絞りセル内へと導入されやすい。したがって、微粒子成分の捕捉・燃焼効率が良好である。また、請求項３記載のように、出口絞りセルと入口閉塞セルとが交互に配置された構造とした場合には、出口絞りセル内に比べて入口閉塞セル内の圧力は低いので、出口絞りセル内の排ガスが隔壁を通り抜けて入口絞りセル内へと導入されやすい。したがって、微粒子成分の捕捉・燃焼効率が良好である。

【００１８】

【発明の実施の形態】以下、実施例により本発明を更に具体的に説明する。

（実施例１）気孔率５０%のコージェライト製ハニカム状体（容量１．３リットル、隔壁厚さ０．３ｍｍ、セル数３００個／ｉｎ²）を準備した。このハニカム状体の出口側端面部約５ｍｍを別途調整したコージェライト粉末のスラリーに浸漬し、引き上げて余分なスラリーを軽く吹き払い、乾燥して焼成した。得られたモノリス担体は、セル断面（排ガス流路）の一辺が１．２ｍｍの正方形状であり、その出口側約５ｍｍにおいて排ガス流路が一辺約０．９ｍｍの正方形状に絞り込まれた形状の出口絞りセルからなる。その後、このモノリス担体に活性アルミナを主体とするウォッシュコート層を形成し、ここに酸化触媒として２ｇ／リットル（触媒構造体１リット

ル当たり２ｇ）のＰｔを担持させた。

【００１９】この排ガス浄化触媒構造体の断面図を図１に示す。モノリス担体１は、厚さ０．３ｍｍ、気孔率５０％の隔壁１１により形成された複数のセル１２を有する。この実施例１では、セル１２はいずれも、モノリス担体１を貫通しており排ガス出口側（図１の右側）に絞り部１３が設けられた出口絞りセル１２１である。出口絞りセル１２１の排ガス入口側（図１の左側）は絞られていない。なお、図１～図５ではウォッシュコート層および触媒成分を省略して示している。

【００２０】（実施例２）実施例２の排ガス浄化触媒構造体の断面図を図２に示す。このモノリス担体１におけるセル１２は、排ガス出口側に絞り部１３が設けられた出口絞りセル１２１と、排ガス入口側に絞り部１３が設けられた入口絞りセル１２２とからなる。出口絞りセル１２１と入口絞りセル１２２とは交互に配置されている。出口絞りセル１２１の出口側端および入口絞りセル１２２の入口側端に設けられた絞り部１３の長さは５ｍｍであり、開口部の形状は０．９ｍｍ²の正方形状である。出口絞りセル１２１の入口側端および入口絞りセル１２２の出口側端は絞られていない。その他の構成および絞り部１３の形成方法は実施例１と同様である。

【００２１】（実施例３）実施例３の排ガス浄化触媒構造体の断面図を図３に示す。このモノリス担体１におけるセル１２は、排ガス出口側に実施例１と同形状の絞り部１３が設けられた出口絞りセル１２１と、排ガス入口側が栓１４により閉塞された入口閉塞セル１２３とからなる。出口絞りセル１２１と入口閉塞セル１２３とは交互に配置されている。出口絞りセル１２１の入口側端および入口閉塞セル１２３の出口側端は絞られていない。その他の構成および絞り部１３の形成方法は実施例１と同様である。

【００２２】（実施例４）実施例１と同じハニカム構造体を用いて、コージェライト粉末のスラリーに浸漬し、引き上げて余分なスラリーを軽く吹き払い、乾燥する工程を二回繰り返した後に焼成した点以外は実施例１と同様にしてモノリス担体１を得た。このモノリス担体１は＊出口絞りセル１２１のみからなり、そのセル断面の一辺は１．２ｍｍの正方形状であり、出口側約５ｍｍにおいて排ガス流路が一辺約０．５ｍｍの正方形状に絞り込まれている。その他の構成は実施例１と同様である。

【００２３】（比較例１）比較例１の排ガス浄化触媒構造体の断面図を図４に示す。この構造体におけるモノリス担体１は、絞り部を形成しない点以外は実施例１と同様にして得られたものであって、絞り部をもたないストレートセル１２４のみからなる。その他の構成は実施例１と同様である。

【００２４】（比較例２）比較例２の排ガス浄化触媒構造体の断面図を図５に示す。この構造体におけるモノリス担体１は、気孔率２０％のコージェライト製ハニカム状体（容量１．３リットル、隔壁厚さ０．１５ｍｍ、セル数４００個／ｉｎ²）を用い、コージェライト粉末のスラリーに浸漬し、引き上げて余分なスラリーを軽く吹き払い、乾燥する工程を二回繰り返した後に焼成した点以外は実施例１と同様にして得られたものである。このモノリス担体１は出口絞りセル１２１のみからなり、そのセル断面の一辺は１．２ｍｍの正方形状であり、出口側約５ｍｍにおいて排ガス流路が一辺約０．５ｍｍの正方形状に絞り込まれている。その他の構成は実施例１と同様である。

【００２５】（評価）実施例１～４および比較例１、２の排ガス浄化触媒構造体を排気量２０００ｃｃのディーゼルエンジンの排気系に取り付け、２０００ｒｐｍ、触媒構造体の入口における排ガス温度４００℃の条件で２時間運転した。運転開始から１時間後および２時間後の時点で、浄化後の排ガスにおける微粒子成分低減率（浄化率）と、触媒構造体に付着した微粒子成分の量とを測定した。なお、燃料としては硫黄分１０ｐｐｍ以下の低硫黄軽油を用いたため、硫黄化合物生成による微粒子低減率悪化は無視できると考えられる。試験結果を表１に示す。

【００２６】

【表１】

表　1

	微粒子成分　低減率（%）		微粒子成分付着量
	１時間後	２時間後	（ｇ／セル数）
実施例１	２４	２１	０．４
実施例２	４２	４０	０．２
実施例３	５５	５１	０．２
実施例４	２８	２７	０．３
比較例１	8	6	０．６
比較例２	9	5	０．５

【００２７】表１から判るように、絞り部をもたないストレートフロー型の触媒構造体を用いた比較例１、および隔壁の気孔率が低いモノリス担体を用いた比較例２に対して、実施例１～４の触媒構造体では、いずれも微粒

子成分の低減率が明らかに向上した。これは、排ガスの一部が隔壁の表面よりも内側に入り込み、この隔壁により微粒子成分が濾過捕集されたためと考えられる。また、このように微粒子成分を隔壁で積極的に捕集しているにもかかわらず、試験後の触媒構造体に付着していた微粒子成分の量は、むしろ実施例のほうが少ない傾向にあった。これは、捕集された微粒子成分が効率的に触媒成分（ここではＰｔ）と反応して燃焼浄化されているためと推定される。

【００２８】なお、構成および上記評価結果から推察される、実施例１～４および比較例１、２の排ガス浄化構造体における排ガスＧの流れを図１～５にそれぞれ示す。実施例１および４の構造体では、図示しないディーゼルエンジンからの排ガスＧは、図１の左側から出口絞りセル１２１に流入する。絞り部１３により流れがやや妨げられており、また隔壁１１の気孔率が高いことにより、排ガスＧの一部は隔壁１１の内部まで進入し、さらに隔壁１１を通り抜けて隣接する出口絞りセル１２１に流入する場合もある。これにより、隔壁１１の表面で微粒子成分を捕捉し、担持された触媒成分と十分に接触させることができる。

【００２９】実施例２の構造体では、下流側に排ガスＧの流れに対する抵抗を設けた出口絞りセル１２１と、下流側が開放された入口絞りセル１２２とが交互に配置されている。さらに、図２の左端から絞り部１３を通って入口絞りセル１２２に流入した排ガスＧが膨張することにより入口絞りセル内１２２が負圧となる。このため、出口絞りセル１２１内に比べて入口絞りセル１２２内は低圧となり、出口絞りセル１２１内の排ガスＧが隔壁１１を通り抜けて入口絞りセル内１２２へと導入されやすい。したがって、微粒子成分の捕捉・燃焼効率が良好である。

【００３０】実施例３の構造体では、下流側に排ガスＧの流れに対する抵抗を設けた出口絞りセル１２１と、入口側が閉塞され下流側が開放された入口絞りセル１２２とが交互に配置されている。出口絞りセル１２１内に比べて入口絞りセル１２２内は低圧となるので、出口絞り＊セル１２１内の排ガスＧが隔壁１１を通り抜けて入口絞りセル内１２２へと導入されやすく、微粒子成分の捕捉・燃焼効率が良い。そして、実施例１～４の構造体において、出口絞りセル１２１は下流側が絞られながらも貫通しているので、排ガスＧ中の微粒子成分やその灰分により閉塞されにくい。

【００３１】これに対して、比較例１の構造体は絞り部をもたないため、排ガスＧがストレートセル１２４を素通りしてしまい、排ガスＧと触媒成分とを十分に接触させることができなかったものと考えられる。また、比較例２の構造体は出口絞りセル１２１を有するが、隔壁１１の気孔率が２０％と低いため、排ガスＧを隔壁１１内に入り込ませることができず、排ガスＧと触媒成分とを十分に接触させることができなかったものと考えられる。

【図面の簡単な説明】

【図１】実施例１の排ガス浄化触媒構造体を示す断面図である。

【図２】実施例２の排ガス浄化触媒構造体を示す断面図である。

【図３】実施例３の排ガス浄化触媒構造体を示す断面図である。

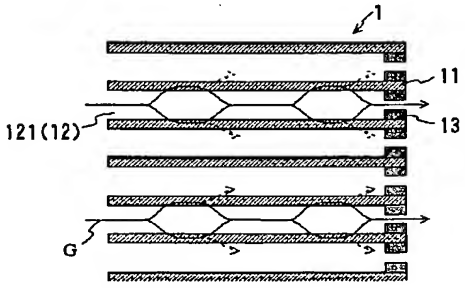
【図４】比較例１の排ガス浄化触媒構造体を示す断面図である。

【図５】比較例２の排ガス浄化触媒構造体を示す断面図である。

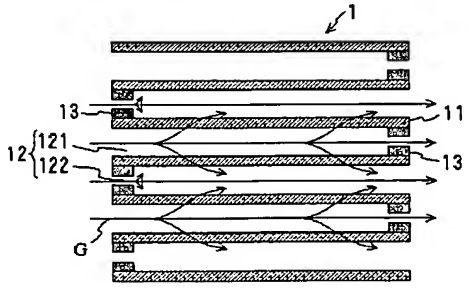
【符号の説明】

１；モノリス担体
１１；隔壁
１２；セル
１２１；出口絞りセル
１２２；入口絞りセル
１２３；入口閉塞セル
１２４；ストレートセル
１３；絞り部
Ｇ；排ガス

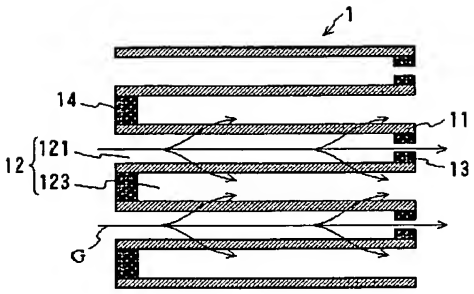
【図１】



【図２】



【図３】



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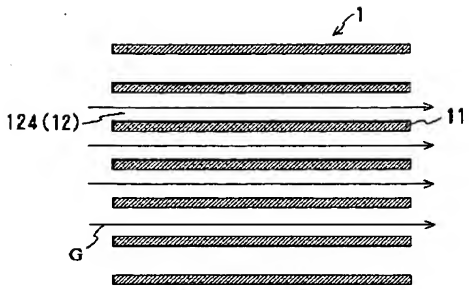

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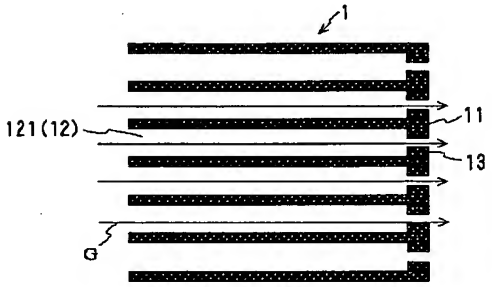

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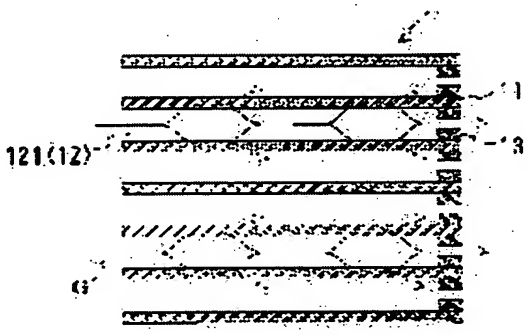
(54) CATALYTIC STRUCTURAL BODY FOR PURIFYING WASTE GAS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a catalytic structural body for purifying waste gas that hardly causes clogging of itself and that improves purifying ratio of a fine particle component.

SOLUTION: The catalytic structural body is composed of a monolith carrier 1 having an outlet throttle cell 121 provided with a throttle part 13 at the outlet side of a waste gas and a catalytic component carried on the monolith carrier 1. The porosity of a partition wall 11 forming the outlet throttle cell 121 is 30-70 vol.%. The fine particle component is collected and brought into sufficient contact with the catalytic component by giving the resistance to the flow of the waste gas by the throttle part 13 to infiltrate the waste gas G into the partition wall 11 having high porosity. The monolith carrier 1 can be provided with an inlet throttle cell or an inlet closing cell having the throttle part 13 arranged at the waste gas inlet side alternately with the outlet throttle cell 121. As the catalytic component, an oxidation catalyst or a catalyst for purifying HC, CO and NOx is preferably used.



LEGAL STATUS

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[Date of final disposal for application]

[Patent number]

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The exhaust gas purification catalyst structure which performs prehension and combustion of the particle component contained in the exhaust gas of a diesel power plant characterized by providing the following Monolith support which has two or more cells formed of the septum It consists of a catalyst component supported by this monolith support, the porosity of the above-mentioned septum is 30 to 70 volume %, two or more above-mentioned cells have penetrated the above-mentioned monolith support, and it is a converging section to an exhaust gas outlet side.
[Claim 2] Two or more above-mentioned cells are the exhaust gas purification catalyst structure according to claim 1 which consists of an entrance drawing cell in which the above-mentioned outlet drawing cell and the above-mentioned monolith support were penetrated, and the converging section was formed in the exhaust gas entrance side and by which this outlet drawing cell and this entrance drawing cell are arranged by turns.
[Claim 3] Two or more above-mentioned cells are the exhaust gas purification catalyst structure according to claim 1 which consists of an entrance lock out cell by which the above-mentioned outlet drawing cell and the exhaust gas entrance side were blockaded and by which this outlet drawing cell and this entrance lock out cell are arranged by turns.
[Claim 4] The exhaust gas purification catalyst structure according to claim 1, 2, or 3 for which the oxidation catalyst is used as the above-mentioned catalyst component.
[Claim 5] The exhaust gas purification catalyst structure of four given in any 1 term from the claim 1 for which the purification catalyst which purifies HC, CO, and NOx is used as the above-mentioned catalyst component.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the exhaust gas purification catalyst structure which performs prehension and combustion of the particle component contained in the exhaust gas of a diesel power plant.
[0002]
[Description of the Prior Art] As a method of purifying the particle component contained in the exhaust gas of a diesel power plant (-- the 1st) -- a **** type -- with the method of burning the particle component which caught and accumulated the particle component in exhaust gas using filters, such as a ceramic honeycomb, by external ignition meanses, such as a burner or a heater, and reproducing the above-mentioned filter (2) Make the above-mentioned filter support the catalyst matter, while catching the particle component in exhaust gas, the catalyst matter is made to also perform combustion, and there is the method of abolishing the need for the reproduction using the burner or the heater, or lessening reproductive frequency. Each of above (1) and methods of (2) has caught the particle component in exhaust gas, when exhaust gas passes through the septum of a filter (wall flow).
[0003] Moreover, the method of burning continuously SOF in a particle component (meltable organic component) is indicated by JP,1-171626,A by contacting exhaust gas and an oxidation catalyst in the wall surface of the circumference of a breakthrough, making three-dimensional structure objects, such as a ceramic honeycomb, support an oxidation catalyst, and passing exhaust gas to the breakthrough of this catalyst structure (straight flow).
[0004]
[Problem(s) to be Solved by the Invention] However, according to the method of the above (1), since equipment becomes complicated in order to require an external ignition means, and a particle component burns rapidly at the time of reproduction, it is easy to damage a filter. Furthermore, if there are many particle components contained in the exhaust gas supplied, the reproduction frequency of a filter increases and it is not economically desirable. According to the method of the above (2), a filter may be damaged by rapid combustion after superfluous deposition difficultly [the combustion control of the particle component of what can lessen reproduction frequency]. Moreover, by the above (1) and the method of (2), there is a problem that the ash content (Ash) which remained after combustion of a particle component is accumulated gradually, and blockades a filter.
[0005] On the other hand, by the method given in above-mentioned JP,1-171626,A, since exhaust gas is passed in a breakthrough and does not pass through a septum, the injury by plugging of the catalyst structure by ash content and rapid combustion of the accumulated particle component cannot take place easily. However, combustion purification with this straight flow method is possible only for SOF in a particle component. The amount of [in a particle component] (Soot) soot is a grade which bypasses the catalyst structure or adheres to a front face at most, and contact of a catalyst component cannot inadequate hatchet burn it. Therefore, compared with a wall flow method, the rate of purification of a particle component is remarkable, and there is a problem of a low.

[0006] The purpose of this invention is to offer the exhaust gas purification catalyst structure by which plugging of the catalyst structure could not happen easily and the rate of purification of a particle component has been improved.
[0007]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the exhaust gas purification catalyst structure according to claim 1 The monolith support which is the exhaust gas purification catalyst structure which performs prehension and combustion of the particle component contained in the exhaust gas of a diesel power plant, and has two or more cells formed of the septum, It is characterized by including the outlet drawing cell in which it consisted of a catalyst component supported by this monolith support, and the porosity of the above-mentioned septum is 30 to 70 volume %, two or more above-mentioned cells had penetrated the above-mentioned monolith support, and the converging section was formed in the exhaust gas outlet side.
[0008] Two or more above-mentioned cells are characterized by for the exhaust gas purification catalyst structure according to claim 2 having penetrated the above-mentioned outlet drawing cell and the above-mentioned monolith support in the structure according to claim 1, and becoming an exhaust gas entrance side from the entrance drawing cell in which the converging section was formed, and arranging this outlet drawing cell and this entrance drawing cell by turns.
[0009] As for the exhaust gas purification catalyst structure according to claim 3, in the structure according to claim 1, two or more above-mentioned cells consist of an entrance lock out cell by which the above-mentioned outlet drawing cell and the exhaust gas entrance side were blockaded, and it is characterized by arranging this outlet drawing cell and this entrance lock out cell by turns.
[0010] The exhaust gas purification catalyst structure according to claim 4. In the structure according to claim 1, 2, or 3, it is characterized by using the oxidation catalyst as the above-mentioned catalyst component. The exhaust gas purification catalyst structure according to claim 5. It is characterized by using the purification catalyst which purifies HC, CO, and NOx as the above-mentioned catalyst component in the structure of four given in any 1 term from a claim 1.
[0011] The "monolith support" in the exhaust gas purification catalyst structure of this invention consists for example, of porosity ceramics etc., and it has two or more penetration cells formed of the septum. The porosity of this septum is 30 to 70 volume %, and is 45 to 55 volume % preferably [it is desirable and] to 40 to 60 volume %, and a pan. Porosity cannot fully demonstrate the effect by the invention in this application under by 30 volume %. On the other hand, the monolith support to which porosity exceeds 70 volume % is difficult to manufacture, and tends to run short of intensity.
[0012] It is the portion by which the passage cross section of the above-mentioned penetration cell was reduced to other portions compared with the above "a converging section." Usually, it is desirable to form this converging section in the outlet side edge of a penetration cell in the case of an outlet drawing cell, and to form it in an entrance-side edge in the case of an entrance drawing cell. Especially the configuration of a converging section is not limited but can be made into the configuration by which opening is formed in the configuration, 1, or two or more corners by which opening (passage) is formed in the center in the cell cross section.
[0013] In the case of an outlet drawing cell, the drawing rate of the passage cross section of the cell in this converging section makes the passage cross section of other portions 100%, it is desirable that the sum total of the area of opening (passage) is 30 - 90%, and it is 50 - 75% still more preferably 40 to 80% more preferably. Moreover, in the case of 2, the passage cross section of the cell in this converging section can be set to 2 0.3-1.2mm 0.3mm in septum thickness, and 300 cell numbers/inch, and can be preferably set to 2 0.4-1.0mm. The length of a converging section is 3-10mm, and is 3-5mm preferably. If the grade of drawing is too large, in this converging section, it will become easy to get an outlet drawing cell blocked by the particle component or its ash content. Moreover, since pressure loss increases and the performance of an internal combustion engine falls substantially, it is not desirable. On the other hand, if the grade of drawing is too small, the effects of making exhaust gas entering in a septum will run short, and the purification performance of a particle component will fall.
[0014] The "catalyst component" which the above-mentioned monolith support is made to support is for

carrying out ignition combustion of the particle, and its thing [using an oxidation catalyst like] according to claim 4 is desirable. As an oxidation catalyst, a kind chosen from a platinum metal, for example or two sorts or more can be used. Thereby, even if the exhaust gas temperature in the entrance of the catalyst structure is the low temperature which is about 400 degrees C, prehension combustion of the particle component can be carried out, without using an external ignition means. Moreover, since this exhaust gas catalyst structure becomes what functions as a 4 yuan catalyst which removes HC, CO, NOx, and a particle (particulate) in using the purification catalyst (for example, NOx occlusion reduction catalyst) according to claim 5 which purifies HC, CO, and NOx as this catalyst component like, it is desirable.

[0015] The above-mentioned catalyst component is usually supported by front reverse side both sides of a septum over the whole monolith support, and the amount of support has an almost uniform desirable thing in each part of monolith support. Especially the amount of support of a catalyst component can be carried out, for example in 1-10g/l., although not limited.

[0016] (An operation and effect) Since the exhaust gas purification catalyst structures of this invention differ in the ****** type ceramic honeycomb used for a conventional wall flow type exhaust gas purification filter and have the penetrated cell, this cell can be easily blockaded by neither a particle component nor its ash content. Moreover, since resistance is given to the emission with the converging section which the porosity of a septum was high and was formed in the outlet side compared with the conventional straight flow type catalyst structure, a part of exhaust gas passes through a septum, or it is easy to enter inside a septum front face (half-wall flow). Therefore, a part of particle component [at least] is caught by the septum, a catalyst component is made to fully contact, not only SOF but soot is burned, and this particle component can be purified. In addition, in the conventional straight flow type catalyst structure, since there was no intention into which exhaust gas is made to enter inside a septum front face, there was no motive to make porosity high, and the intensity of the structure and the porosity of the ease of manufacture to a septum were usually 15 - 25 volume % grades.

[0017] The exhaust gas in an outlet drawing cell passes through a septum, and it is tended into an entrance drawing cell to introduce the inside of an entrance drawing cell negative pressure and a bird clapper, when it considers as the structure according to claim 2 where the outlet drawing cell and the entrance drawing cell have been arranged by turns, like. Therefore, prehension and combustion efficiency of a particle component are good. Moreover, when it considers as the structure according to claim 3 where the outlet drawing cell and the entrance lock out cell have been arranged by turns, like, compared with the inside of an outlet drawing cell, the exhaust gas in an outlet drawing cell passes through a septum, and it is easy for the pressure in an entrance lock out cell to be a low, and to be introduced into an entrance drawing cell. Therefore, prehension and combustion efficiency of a particle component are good.

[0018]

[Embodiments of the Invention] Hereafter, an example explains this invention still more concretely. (Example 1) The honeycomb-like object made from a cordierite of 50% of porosity (0.3mm in the capacity of 1.3l. and septum thickness, the number of cells 300 pieces/inch 2) was prepared. It was immersed in the slurry of the cordierite powder adjusted separately, 5mm of outlet side end-face **** of this honeycomb-like object was pulled up, the excessive slurry was blown off lightly, and it dried and calcinated. One side of a cell cross section (exhaust gas passage) has the shape of a square which is 1.2mm, and the obtained monolith support consists of an outlet drawing cell of the configuration to which exhaust gas passage was narrowed down in the shape of [one-side / it is / in the shape of / about 0.9mm] a square in about 5mm of the outlet side. Then, the wash coat layer which makes an activated alumina a subject was formed in this monolith support, and 2g [/l.] (2g per 1l. of catalyst structures) Pt was made to support here as an oxidation catalyst.

[0019] The cross section of this exhaust gas purification catalyst structure is shown in drawing 1 . The monolith support 1 has two or more cells 12 formed of the septum 11 of 0.3mm in thickness, and 50% of porosity. In this example 1, a cell 12 is the outlet drawing cell 121 in which the monolith support 1 was penetrated and the converging section 13 was formed in the exhaust gas outlet side (right-hand side

of drawing 1) by each. The exhaust gas entrance side (left-hand side of drawing 1) of the outlet drawing cell 121 is not extracted. In addition, drawing 1 - drawing 5 omit and show the wash coat layer and the catalyst component.

[0020] (Example 2) The cross section of the exhaust gas purification catalyst structure of an example 2 is shown in drawing 2 . The cell 12 in this monolith support 1 consists of an outlet drawing cell 121 in which the converging section 13 was formed in the exhaust gas outlet side, and an entrance drawing cell 122 in which the converging section 13 was formed in the exhaust gas entrance side. The outlet drawing cell 121 and the entrance drawing cell 122 are arranged by turns. The length of the converging section 13 formed in the outlet side edge of the outlet drawing cell 121 and the entrance-side edge of the entrance drawing cell 122 is 5mm, and the configuration of opening has the shape of a square of 2 0.9mm. The entrance-side edge of the outlet drawing cell 121 and the outlet side edge of the entrance drawing cell 122 are not extracted. Other composition and the formation method of a converging section 13 are the same as that of an example 1.

[0021] (Example 3) The cross section of the exhaust gas purification catalyst structure of an example 3 is shown in drawing 3 . The cell 12 in this monolith support 1 consists of an outlet drawing cell 121 in which the converging section 13 of the shape of an example 1 and isomorphism was formed in the exhaust gas outlet side, and an entrance lock out cell 123 by which the exhaust gas entrance side was blockaded with the plug 14. The outlet drawing cell 121 and the entrance lock out cell 123 are arranged by turns. The entrance-side edge of the outlet drawing cell 121 and the outlet side edge of the entrance lock out cell 123 are not extracted. Other composition and the formation method of a converging section 13 are the same as that of an example 1.

[0022] (Example 4) Using the same honeycomb-structure object as an example 1, it was immersed in the slurry of cordierite powder and the monolith support 1 was obtained like the example 1 except the point calcinated after having pulled up, blowing off the excessive slurry lightly and repeating the process to dry twice. This monolith support 1 consists only of an outlet drawing cell 121, one side of the cell cross section has the shape of a 1.2mm square, and exhaust gas passage is narrowed down in about 5mm of outlet sides in the shape of [one side / it is / in the shape of / about 0.5mm] a square. Other composition is the same as that of an example 1.

[0023] (Example 1 of comparison) The cross section of the exhaust gas purification catalyst structure of the example 1 of comparison is shown in drawing 4 . Except the point which does not form a converging section, the monolith support 1 in this structure is obtained like an example 1, and consists only of a straight cell 124 without a converging section. Other composition is the same as that of an example 1.

[0024] (Example 2 of comparison) The cross section of the exhaust gas purification catalyst structure of the example 2 of comparison is shown in drawing 5 . Using the honeycomb-like object made from a cordierite of 20% of porosity (0.15mm in the capacity of 1.3l., and septum thickness, the number of cells 400 pieces/inch 2), the monolith support 1 in this structure is immersed in the slurry of cordierite powder, and is obtained like an example 1 except the point calcinated after having pulled up, blowing off the excessive slurry lightly and repeating the process to dry twice. This monolith support 1 consists only of an outlet drawing cell 121, one side of the cell cross section has the shape of a 1.2mm square, and exhaust gas passage is narrowed down in about 5mm of outlet sides in the shape of [one side / it is / in the shape of / about 0.5mm] a square. Other composition is the same as that of an example 1.

[0025] (Evaluation) The exhaust gas purification catalyst structure of examples 1-4 and the examples 1 and 2 of comparison was attached in the exhaust air system of a diesel power plant with a displacement of 2000 cc, and it operated for 2 hours on conditions with an exhaust gas temperature [in the entrance of 2000rpm and the catalyst structure] of 400 degrees C. At the time after (1 hour and 2 hours) a start up, the rate of particle component reduction in the exhaust gas after purification (rate of purification) and the amount of the particle component adhering to the catalyst structure were measured. In addition, since low-sulfur gas oil of 10 ppm or less of sulfur contents was used as fuel, it is thought that the rate aggravation of particle reduction by sulfur-compound generation can be disregarded. A test result is shown in Table 1.

[0026]

[Table 1]

表 1

	微粒子成分 低減率 (%)		微粒子成分付着量
	1時間後	2時間後	(g／セル数)
実施例1	24	21	0．4
実施例2	42	40	0．2
実施例3	55	51	0．2
実施例4	28	27	0．3
比較例1	8	6	0．6
比較例2	9	5	0．5

[0027] As shown in Table 1, by the catalyst structure of examples 1-4, the rate of reduction of a particle component all improved clearly to the example 1 of comparison using the straight flow type catalyst structure without a converging section, and the example 2 of the comparison using low monolith support of the porosity of a septum. A part of exhaust gas enters inside the front face of a septum, and this is considered because the filtration uptake of the particle component was carried out by this septum. Moreover, in spite of having carried out the uptake of the particle component positively by the septum in this way, the amount of the particle component adhering to the catalyst structure after an examination suited the inclination with few examples rather. This is presumed because the particle component by which the uptake was carried out reacts with a catalyst component (here Pt) efficiently and combustion purification is carried out.

[0028] In addition, the flow of exhaust gas G in the exhaust gas purification structure of the examples 1-4 and the examples 1 and 2 of comparison which are guessed from composition and the above-mentioned evaluation result is shown in drawing 1 -5, respectively. In the structure of examples 1 and 4, exhaust gas G from the diesel power plant which is not illustrated flows into the outlet drawing cell 121 from the left-hand side of drawing 1 . The flow is barred a little by the converging section 13, and according to the porosity of a septum 11 being high, a part of exhaust gas G may advance to the interior of a septum 11, and it may flow into the outlet drawing cell 121 which passes through a septum 11 further and adjoins. Thereby, a particle component can be caught on the front face of a septum 11, and the supported catalyst component can be made to fully contact.

[0029] In the structure of an example 2, the outlet drawing cell 121 which prepared the resistance to the flow of exhaust gas G in the downstream, and the entrance drawing cell 122 in which the downstream was opened wide are arranged by turns. Furthermore, when exhaust gas G which flowed into the entrance drawing cell 122 through the converging section 13 from the left end of drawing 2 expands, 122 in an entrance drawing cell becomes negative pressure. For this reason, compared with the inside of the outlet drawing cell 121, the inside of the entrance drawing cell 122 serves as low voltage, and exhaust gas G in the outlet drawing cell 121 passes through a septum 11, and it is easy to be introduced 122 in an entrance drawing cell. Therefore, prehension and combustion efficiency of a particle component are good.

[0030] In the structure of an example 3, the outlet drawing cell 121 which prepared the resistance to the flow of exhaust gas G in the downstream, and the entrance drawing cell 122 in which the entrance side was blockaded and the downstream was opened wide are arranged by turns. Since the inside of the entrance drawing cell 122 serves as low voltage compared with the inside of the outlet drawing cell 121, exhaust gas G in the outlet drawing cell 121 passes through a septum 11, it is easy to be introduced 122 in an entrance drawing cell, and prehension and combustion efficiency of a particle component are good. And in the structure of examples 1-4, since the downstream has penetrated the outlet drawing cell 121 despite a rat tail, the particle component in exhaust gas G and its ash content are hard to be blockaded.

[0031] On the other hand, since the structure of the example 1 of comparison does not have a converging section, exhaust gas G bypasses the straight cell 124, and it is considered that it was not fully

able to contact exhaust gas G and a catalyst component. Moreover, although the structure of the example 2 of comparison has the outlet drawing cell 121, for a 20% and low reason, the porosity of a septum 11 cannot make exhaust gas G enter in a septum 11, but is considered that it was not fully able to contact exhaust gas G and a catalyst component.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2. *** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the cross section showing the exhaust gas purification catalyst structure of an example 1.
[Drawing 2] It is the cross section showing the exhaust gas purification catalyst structure of an example 2.
[Drawing 3] It is the cross section showing the exhaust gas purification catalyst structure of an example 3.
[Drawing 4] It is the cross section showing the exhaust gas purification catalyst structure of the example 1 of comparison.
[Drawing 5] It is the cross section showing the exhaust gas purification catalyst structure of the example 2 of comparison.
[Description of Notations]
1; monolith support
11; septum
12; cell
121; outlet drawing cell
122; entrance drawing cell
123; entrance lock out cell
124; straight cell
13; converging section
G; exhaust gas

[Translation done.]

* NOTICES *

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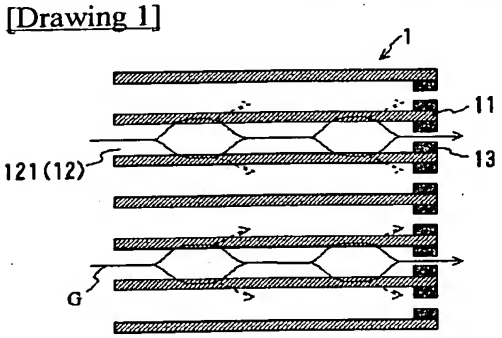
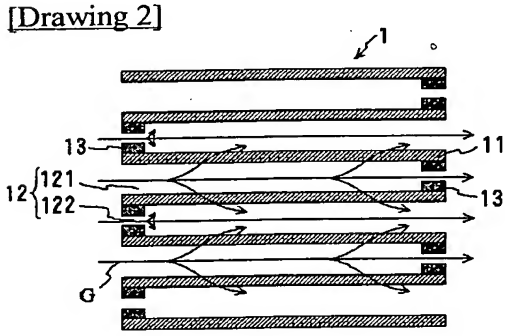
3.In the drawings, any words are not translated.

DRAWINGS

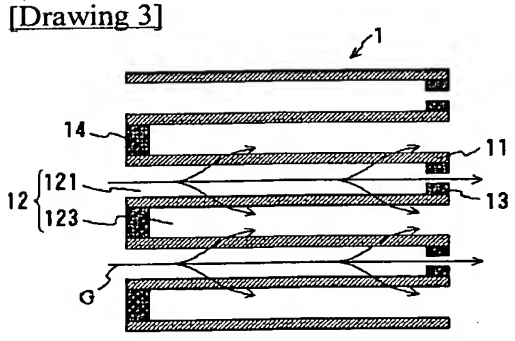
[Drawing 1]



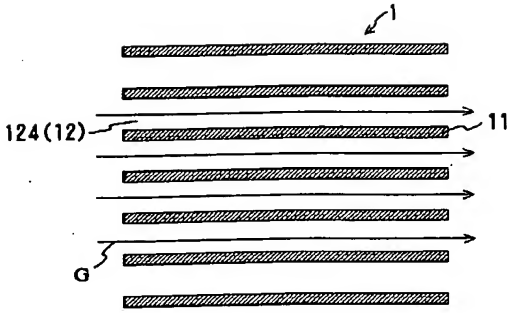
[Drawing 2]



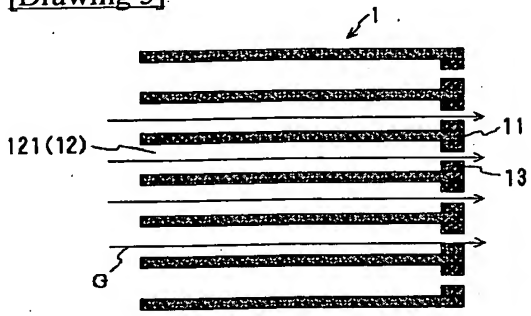
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]